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Technical Report No. 2

A Program of Research on the Identification, Motivation, and Training of Talented Students

Research and Studies

National Merit Scholarship Corporation

During the past year, more and more educators and psychologists have turned their attention to the study of talented students and their training. Several events have stimulated this interest and helped to clarify some of the issues requiring research: the publication of Talent and Society (6); Flanagan's report (1) of an extensive project to identify talented junior high school students; the report of the Social Science Research Council Committee on Personality Development in Youth (5); Russell's summary (8) of educational problems and practices which need re-evaluation; and the Senate and House hearings (2, 9) on federal aid to education.

A previous report (10) summarized the aims, methods, and preliminary results of research being conducted under the auspices of the National Merit Scholarship Corporation and financed by the National Science Foundation, the Old Dominion Foundation, and NMSC. The present paper outlines research activities for the nine-month period January, 1958 through September, 1958. In the future, annual status reports will cover activities for each fiscal year.

The major goals of our program are represented by four areas of research: Identification of Talent, Identification of Environments Conducive to the Development of Talent, Conservation of Talent, and Methodological and Descriptive Studies. In the following sections, the investigations

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completed or in progress during the nine-month period are summarized. The concluding sections list the staff for this period and all the studies completed during the entire period of research operation, January, 1957 through September, 1958.

I. The Identification of Intellectual Talent

A preliminary theory was developed to guide the selection of predictive variables and the construction of new assessment devices. The first product of this theory, the National Merit Student Survey (see project 1 below), is an inventory consisting of 10 a priori scales--Internal-External Orientation, Dominance, Parental Press, Scholarship, Pleasure, Dependence, Intellectualism, Persistence, Super-Ego, and Tolerance for Ambiguity--suggested by previous studies of the prediction of college grades.

The majority of National Merit studies have investigated the non-intellectual and situational determinants of achievement among highly talented students. A more comprehensive survey of situational factors is planned; it will assess socio-economic status and its correlates, parental attitudes and values, peer and sibling relationships, and the influence of teachers and other adults. In future studies of student samples, we hope to increase the pool of empirical variables and to develop from them, by successive approximations, a smaller set of predictive variables related to one another by a systematic theory of intellectual achievement. Such a theory is needed to integrate the mass of empirical findings and to direct future research.

1. The Prediction of College Grades and Post-College Achievement. The basic data for this investigation include biographical information, teacher ratings, and three inventories--the Cattell 16 Personal Factors, the National Merit Student Survey, and the Vocational Preference Inventory. A one-

sixth random sample of the finalists (the top-scoring 7500 students from which Scholars were selected in 1958) was tested and polled (89 per cent return, or N-1256). Following an internal consistency analysis which eliminated unsatisfactory items, the revised scales were rescored. When grades become available in June, 1959, the first of a series of predictive tests based on these data will be made. The entire series will include studies of the prediction of college grades and of post-college vocational achievement and creativity, vocational choice, and adjustment status. (In progress)

2. The Prediction of College Grades by Means of Personality, Attitudinal, and Scholastic Aptitude Variables. The California Psychological Inventory, the Inventory of Beliefs, and the CEEB Scholastic Aptitude Test, which were used previously in a study of college choice, will also be tested for their ability to predict the college grades of students attending different kinds of colleges and to distinguish students majoring in science from those majoring in other fields. (In progress)

3. The Meaning of High School Achievement. This study attempts to define the significance of high school rank (HSR) by relating it to extracurricular achievement, SAT scores, CPI and Inventory of Beliefs scales, and socio-economic status. Since HSR is often an important criterion for awarding scholarships, it is important to learn more about its correlates as well as its predictive value. (In progress)

II. Environments Conducive to the Development of Talent

At present, our research on environments conducive to the development of intellectual talent is confined to the college level, primarily because of the difficulties of determining the relative talent supplies of secondary schools throughout the country.

1. The Identification of College Environments which Motivate Students to Seek the Ph.D. Degree. Colleges differ markedly in the percentage of their graduates who go on to get doctorates. Previous studies (3, 4) of these differences have ignored the fact that some schools get a higher proportion of talented students than others, and so should be expected to have a greater proportion of their graduates attain Ph.D.'s. From a comparative study of 511 institutions, two adjusted productivity measures were developed, one for the Natural Sciences and one for the Arts, Humanities, and Social Sciences. The indexes are residual scores which represent the discrepancy between the school's expected Ph.D. productivity, as predicted from its enrollment of talented students, and its actual productivity. Thus, the figure for a particular school represents the relative success of that school in stimulating its undergraduates to get higher degrees, the rating of success being independent of the quality of the student body.

The following institutional characteristics are associated with Ph.D. productivity in the Natural Sciences: large library, coeducational or co-ordinate student body, large freshman enrollment, professional or graduate schools, absence of religious affiliation, and public control. Colleges outstandingly effective in stimulating the student to seek a Ph.D. in the Arts, Humanities, and Social Sciences tend to be coeducational or co-ordinate, are often located in small cities, have a greater number of students per faculty member, and frequently do not offer the M.A. or Ph.D. degree.

Using the reports of 916 students attending a selected group of 36 colleges and universities, the relation of college environment to productivity was further analyzed. Merit Scholars and Certificate of Merit winners in the 1956 competition, sophomores in college at the time of the study, described their college environments by completing the College

Characteristics Index (7). The analysis of items descriptive of faculty behaviors indicates that the effective teacher is distinguished by certain attitudes and actions. The faculties of high and low productivity schools differ--at least, faculty behavior is described differently by student observers at schools which differ widely in their productivity indexes. Institutions with high productivity in both the Natural Sciences and the Arts, Humanities, and Social Sciences have faculties who (a) emphasize preparation for graduate study, and (b) are less concerned with close control and supervision of the students.

The following characteristics are associated primarily with Natural Science productivity: (a) informality and warmth of student-faculty contacts, (b) emphasis upon high academic standards in grading students, and (c) absence of close control and direction of schoolwork.

Typical attributes of schools with high productivity in the Arts, Humanities, and Social Sciences are (a) emphasis upon independent study, (b) frequent student-faculty contacts outside the classroom, (c) excellent social science faculty and resources, and (d) energetic and controversial instruction. In contrast, the following characteristics are negatively related to "non-science" productivity: (a) frequent appraisals of student performance, and (b) highly organized curricula and structured courses.

The analysis for this project is almost completed. A preliminary report has been prepared on the correlates of Natural Science productivity. (Cf. ref. 19)

2. Related Problems. The following questions should be answered if we are to better understand the causes of differences in college productivity. (a) How does the practice of using different observers to report on different colleges affect the results? It is possible that the college's

students represent a biased sample and that certain constant errors of observation are operating. If so, descriptions of faculty behaviors may be distorted by the peculiarities of the student informants. Ultimately, it may be necessary to send a team of observers to each institution, but for the present, a comparison of student and faculty reports--while not definitive--may help to assess observational biases. (b) How can we develop measures of the college environment which are uninfluenced by diversities in college talent supplies? One difficulty with current measures of the college environment is that they do not assess faculty and student behaviors independently; thus they may be influenced by characteristics which students bring to the college. Scales descriptive of faculty behaviors represent the most promising antecedent variables for further research, since these behaviors are relatively independent of college talent supplies. (c) How can we check the validity of our initial assumptions? In the foregoing study, it was assumed that the talent supply and environment of a given college are stable (that is, that they remain relatively the same over a period of years) and that students from all colleges take the same amount of time to get a Ph.D. We plan a longitudinal study which will compare the rates at which different colleges stimulate their National Merit finalists to seek advanced degrees; the results will provide an independent test of the generality of our findings.

III. Conservation of Talent

Scholarship programs assume that financial aid and public recognition, when properly administered, can increase the supply of specialized talent. This assumption has been explored in several investigations, which indicate that (a) the percentage of near-winners in the Merit program who do not go

to college is extremely small (probably not more than 5 per cent); (b) Merit Scholarships, awarded to the highest-ranking students in a nationwide competition, probably do not directly increase the number of talented students going to college; (c) public recognition for outstanding performances on aptitude tests tends to increase the number of students planning to become college teachers or scientific researchers and the number planning to seek the Ph.D. or M.D. degree. These results suggest two areas for further research: first, we can try to define more precisely how aid and recognition affects the behaviors of students in the upper five per cent of the high school class and to discover how desirable effects may be increased; secondly, we can study the effectiveness of financial aid and recognition in stimulating slightly less able students (those in the 70th to 95th percentile) to attend college.

Studies 1, 2, and 3 below, which are concerned with students in the top five per cent of the senior class, belong in the first area; and study 4, which proposes to investigate talent loss at lower ability levels, belongs in the second.

1. Talent Loss Among Participants in the 1957 Merit Program. From a survey of students who ranked among the top 15,000 in the 1957 competition, it was estimated that only 600 students (four per cent) did not enroll in college immediately. Of these 600 "drop-outs," 500 plan to do at least some college work. The small drop-out rate is attributed partly to the social recognition that Merit finalists received. The factors which most clearly distinguish drop-outs from college-goers are: (a) lower vocational and educational aspirations, (b) less cultural stimulation in the home, (c) fewer applications for other scholarships. (Cf. ref. 11) (Completed)

2. Effects of Scholarships upon College Enrollment and Educational Motivation. In an ex post facto study of participants in the 1957 program, Scholars were matched with C of M winners on four variables--sex, aptitude scores, percentile rank in high school class, and family financial resources --and the resulting 194 pairs analyzed for differences in the college-going behavior of the two groups. It was found that Scholars differ from C of M winners in the following ways: (a) Scholars, particularly those with outstanding records of high school achievement, are more likely to attend the college of first choice; (b) Scholars, especially those who score below the median in aptitude tests, are more likely to attend colleges with small freshman classes; (c) Scholars more frequently go to private colleges; this is particularly true of those who ranked higher in high school, those who have lower aptitude levels, and those who received large stipends; (d) Scholars more frequently enroll at colleges which have religious affiliations. In addition, it was found that students receiving large stipends are influenced to attend higher cost colleges and to seek advanced degrees. Scholarships also tend to increase the number of boys attending college as residents. (Cf. ref. 17) (Completed)

3. Effects of Social Recognition Upon the Educational Motivation of Talented Youth. An ex post facto comparison was made of the educational motivation of two groups of talented students (C of M winners and commended students); the two groups differed in the amount of public recognition they received for their performances on college aptitude tests. In all, 1,302 pairs were matched on sex, verbal aptitude, geographical origin, and father's occupation. It was found that increased recognition increases (a) the favorableness of attitudes toward intellectualism, (b) the number of students planning to get the Ph. D. or M.D. degrees, and (c) the number of students

planning to become college teachers or scientific researchers. The latter effect was observed particularly among students whose fathers are employed in non-professional occupations and among students with only moderately high verbal aptitudes. In addition, public recognition increases the likelihood that the student will obtain a scholarship from his college or from some other scholarship-granting agency. (Cf. ref. 18) (Completed)

4. Survey of 479,000 Participants in the 1958 National Merit Talent Search. The design for a survey of a stratified random sample of students who took the 1958 Scholarship Qualifying Test has been completed. The purposes of this survey are (a) to estimate current talent loss over a wider range of ability levels, (b) to identify factors contributing to talent loss, (c) to study the parental, geographic, and economic determinants of college choice among the most talented third of the nation's college-bound students, and (d) to study the determinants of choice of college major for this population. (In progress)

IV. Methodological and Descriptive Studies

Our chief emphasis is on studies central to the main objectives of the Corporation and the research program--for instance, the identification of talent, college environments, and talent loss. But whenever practicable, we will continue to study various special problems, including vocational adjustment and choice, counseling, and choice of undergraduate college. Such studies provide status reports about talented youth and make use of available data relevant to problems of general scientific and educational interest.

1. Parental Expectations and Attitudes about College. This survey summarizes parents' nominations of the "best" college, their descriptions of the ideal college, and their expectations of how college will affect

their children. The results suggest that a quasi-hierarchy of colleges exists in the minds of parents, and that they conceive of the "ideal" or "good" college as a private coeducational institution with a national reputation, an outstanding faculty, and high scholastic standards. (Cf. ref. 13) (Completed)

2. Determinants of College Choice. In a study of samples of Scholars and Certificate of Merit winners, the correlates of college choice were examined by classifying the student's choice of college according to four categories: (a) more versus less popular, (b) high versus low Knapp-Goodrich index, (c) religious versus nonreligious affiliation, and (d) public versus private control. College choice was then correlated with the questionnaire responses of the student and his parents, and with the student's test scores on the SAT, CPI, and Inventory of Beliefs. We found four distinctive patterns of choice, which suggest that colleges receive talent supplies which differ in many respects, including scholastic ability, major field of study, educational values, personality, and family background. In general, institutions which are private, nonreligious, and high-ranking on the Knapp-Goodrich index attract students with greater achievement potential; that is, students at these colleges have personal traits and family backgrounds which are conducive to achievement. (Cf. ref. 12) (Completed)

3. The Classification of Occupations in Terms of Personality and Intelligence. In an occupational classification derived by reviewing the literature, six classes were proposed--the physical, intellectual, sociable, conforming, verbal, and emotional. Each class is defined by a particular set of personality variables which seem to be typical of persons in the class. The classes are further subdivided into intelligence levels. (Cf. ref. 16) (Completed)

4. Counseling High Aptitude Students of Scholarship Opportunities. Survey data from 5,126 near-winners in the 1957 Merit program were used to compare successful and unsuccessful scholarship applicants. The two groups differed most in the number and types of applications made. Unsuccessful applicants made fewer applications and applied only to private or popular colleges. These behaviors are especially true of unsuccessful applicants who failed to enroll in college immediately. More than half of the near-winners in the present study report that their high school did not have a library of references and books about available scholarships. It is recommended that high school counselors (a) encourage talented students who need aid to make multiple and diversified scholarship applications, and (b) improve their school's collection of reference books describing scholarship opportunities. (Cf. ref. 14) (Completed)

5. College Scholarship Offers and the Enrollment of Talented Students. Some of the college characteristics associated with the "over-enrollment" and "under-enrollment" of talented students were revealed by an analysis of survey data obtained from near-winners in the 1956 Merit program. The characteristics of the college were correlated with a residual score representing the discrepancy between the college's enrollment of near-winners and the enrollment predicted on the basis of the number of scholarship offers which near-winners reported receiving from the college. These residual scores represent indexes--adjusted to remove differences in recruiting policies--of the "drawing power" or "popularity" of the institution. The characteristics most clearly associated with the "over-enrollment" of talented students are: (a) programs offering advanced degrees, (b) large libraries, (c) large freshman enrollments, (d) high cost, and (e) location in New England, East North Central, or Pacific census regions. There is a moderately

high relationship between the college;s success in enrolling talented students and the number and value of scholarship offers made by the college (.65 and .69 respectively). Approximately two-thirds of the scholarship offers received by this group of near-winners came from colleges or universities; governmental agencies contributed about 10 per cent of the offers; business and industry contributed six per cent. (Cf. ref. 15) (Completed)

6. The Concentration of Talent at American Colleges and Universities.

It has been found that the percentage of the college's freshman class who are Scholars or C of M winners in the National Merit competition is a good measure of the intellectual quality of the college's student body. For freshman men at 39 colleges, the correlation between mean CEEB Scholastic Aptitude Test scores (V+Q) and per cent of the freshman class who were Merit finalists was .74; for freshman women at 43 colleges, the correlation between mean SAT scores and this percentage index was .76. Such indexes of talent concentration for 1956 and 1957 freshman classes have been correlated with ecological, structural, and policy characteristics of 352 institutions of higher learning. The analysis of data for this study is almost completed. (In progress)

Plans for the Future

The participants in the annual National Merit Programs constitute a population offering unparalleled opportunities for the study of talented students. The Program has steadily attracted a greater and greater proportion of high school seniors. In the first year of operation, 58,000 talented students were screened; in the second, over 166,000; in the third, 256,000; and in the fourth, almost 479,000 students, or about 27 per cent of the estimated number of high school seniors in the school year 1958-59. Of the

479,000 screened in 1958-59, it is estimated that 55 per cent of all seniors at or above the 72nd percentile in college aptitude were participants in the program. Such an extensive pool of talented youth has never before been accessible to investigators working on the problems of identifying, motivating, and training the intellectually gifted.

Our experience in the last two years has served to clarify some of the research problems most amenable to study. With this experience in mind, we have directed our research program toward achieving the following goals:

(1) development of knowledge about the personal variables prognostic of high achievement, productivity, and creativity in college and in post-college careers;

(2) development of a theory of creativity and achievement;

(3) development of knowledge about the college characteristics which contribute to the enhancement of exceptional intellectual talent;

(4) development of a theory of the higher education of gifted youth;

(5) development of knowledge about the effectiveness, and about methods for increasing the effectiveness, of scholarships and social recognition as incentives for motivating talented students to seek advanced training.

The attainment of the goals outlined here will require a series of longitudinal studies for each student sample, as well as continuous systematic exploration of the present areas of research. At present, we plan follow-up studies for each college year and for the 2nd, 5th, and 10th post-college years. It is hoped that this plan can be applied to all 10 student populations so that the minimum schedule of longitudinal studies will be as follows:

	Follow-up studies by Year													
Scholars	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
1956	X	X	X	X		X			X					X
1957		X	X	X	X		X			X				
1958			X	X	X	X		X			X			
1959				X	X	X	X		X			X		
1960					X	X	X	X		X			X	
1961						X	X	X	X		X			X
1962							X	X	X	X		X		
1963								X	X	X	X		X	
1964									X	X	X	X		X
1965										X	X	X	X	

Our ability to execute this research plan will, of course, hinge on our future resources, including staff size and increased financial support. At present, funds are available to finance research activities until June 30, 1961. Thereafter, the full exploitation of our research advantages will necessitate increased support.

Research Staff

The following persons were employed on the research staff during the period covered in this report:

Name	Title	Period of Employment	% of time
John L. Holland	Director of Research	Jan. 1 - Sept. 30	100%
Donald L. Thistlethwaite	Associate Director of Research	Jan. 1 - Sept. 30	100%
Rex L. Hanks, Jr.	Research Assistant	Jan. 1 - Mar. 31 Apr. 1 - Sept. 30	70% 100%
Laura P. Kent	Research Assistant	Jan. 1 - Sept. 30	50%
John B. Suby	Research Assistant	Jan. 1 - Mar. 14	60%
F. Suzanne Brua	Secretary	Jan. 1 - Sept. 30	100%
Virginia O. Chalmers	Secretary	Jan. 1 - Sept. 30	100%
Annette Kanner	Secretary	Jan. 1 - Sept. 30	100%

Contracted clerical services - 210 hours

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